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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/923,701	08/06/2001	Anne Kurtenbach	P2000,0145	1576

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EXAMINER

HASSANZADEH, PARVIZ

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 09/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/923,701

Applicant(s)

KURTENBACH ET AL.

Examiner

Parviz Hassanzadeh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 and 21 is/are pending in the application.
- 4a) Of the above claim(s) 1-9 and 21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Group II, method claims 10-20, in Paper No. 7 is acknowledged.

Claims 1-9 and 21 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected apparatus, there being no allowable generic or linking claim.

Election was made **without** traverse in Paper No. 7.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 10, 12-15, 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oxford (US Patent No. 4,060,097) in view of Admitted Prior Art by the Applicants (pages 1-2).

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Oxford teaches an apparatus for removing a material from a workpiece (*semiconductor device*) and a method of using the same, the apparatus comprising:

an etching machine 10 including a workpiece inserted therein by a conveyor (not shown) and an etchant that produces a change in color as the vigor of the etchant is dissipating (*providing a reactor; inserting at least one semiconductor device with deposited organic material into the reactor; inserting fluid ingredients for removing the organic material from the semiconductor device into the reactor*);

low voltage light sources 106, 96 disposed along a pipe 25 (*transmitting an emitted optical radiation towards the fluid*);

color sensors 24 and 28 disposed along the pipe 25 and opposing the light source 106, 96, respectively (*receiving transmitted optical radiation transmitted through the fluid; detecting an optical radiation intensity not influenced by process induced bubbles*); and

meter relay devices 32, 34 controlling the pumps 52, 58 for introducing acid and oxidizer, respectively, to a reaction chamber 27 that flows into the etching machine 10 (*controlling the insertion of at least one of the ingredients in dependence on the detected optical radiation intensity*).

Oxford fail to teach the workpiece being a semiconductor device having a deposited layer of photoresist material and removing the photoresist material from the semiconductor device using heated fluid.

The admitted prior art teaches a process for removing (etching away) organic material such as photoresist materials from a semiconductor wafer, wherein the removing agent (etchant) includes sulphuric acid and hydrogen peroxide which are heated up to 130 °C.

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Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the heated fluid (removing agent or etchant) as taught by the admitted prior art in the apparatus and method of Oxford for removing a photoresist (organic) layer on a semiconductor wafer.

Further regarding claims 12, 17-19: when the color density of light passing through the pipe 25 falls below the prescribed parameter as set by the potentiometer 114, the indicator 112 falls outside the present limits and provides a visual indication that the composition of the etchant is unsatisfactory (*detecting maximum values of optical radiation intensity as recited in claim 12; and comparing the detected optical radiation intensity with an initial radiation intensity or a predefined value as recited in claims 17, 18*) (column 5, lines 40-45). The meter relay 32 maintain a continuous monitoring of the color density of the etchant. If the etchant has a satisfactory color density (*detecting a minimum value of the measured optical radiation intensity curve as recited in claim 19*), a switch 118 is in contact with the neutral contact 120 (column 5, lines 52-56).

Further regarding claims 13, 14: heated fluid for removing the photoresist layer is heated sulphuric acid and hydrogen peroxide as taught by the admitted prior art.

Further regarding claim 15: the apparatus further includes a timer 64 that is enabled by meter relay 34 and times out a preset interval. If after the preset interval has passed (*monitoring the optical radiation intensity over a defined time period*), no curing color density change has been detected by meter relay 34, then the timer 64 causes the latching relay 42 to switch over to the other motor 44 or 46 that in turn causes the other constituent component to be added to the reaction chamber 7 (column 4, lines 47-54).

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Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oxford (US Patent No. 4,060,097) in view of Admitted Prior Art by the Applicants (pages 1-2) as applied to claims 10, 12-15, 17-19 above, and further in view of O'Neill et al (US Patent No. 5,683,538).

Oxford in view of Admitted Prior Art teaches all limitations of the claim as discussed above except for the modulating the emitted optical radiation and demodulating the transmitted optical radiation.

O'Neill et al teach an apparatus (Fig. 1) and a method for monitoring an etchant concentration using an ultraviolet absorption spectroscopy, wherein a radiation beam 56 is chopped (modulated) by a chopper 68 to provide pulses of radiation to be received at the monochromator 62 which is in communication with a lock-in amplifier 72 (demodulating) for improving signal-to-noise ratio during reception of the radiation (column 4, line 58 through column 5, line 25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the modulated UV absorption spectrometer as taught by O'Neill et al in the apparatus and method of Oxford in view of admitted prior art in order to improve the signal-to-noise ratio of the detected signal.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oxford (US Patent No. 4,060,097) in view of Admitted Prior Art by the Applicants (pages 1-2) as applied to claims 10, 12-15, 17-19 above, and further in view of Dennis (US Patent No. 4,710,261).

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Oxford in view of Admitted Prior Art teaches all limitations of the claim as discussed above except for the emitting optical source transmitting a blue light towards the fluid.

Dennis teaches an apparatus (Fig. 1) and a method for maintaining a uniform etching solution composition, wherein a UV detector 26 having a wavelength of 280 nm is employed to detect the concentration of a depleted component HNO_3 (abstract, column 2, lines 30-49).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the UV detector as taught by Dennis in the apparatus and method of Oxford in view of admitted prior art as an art recognized equivalent means and method of monitoring the concentration of a depleted component during the etching process.

Response to Arguments

Applicant's arguments with respect to claim 10-19 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Reis (US Patent No. 6,255,123 B1) teaches an apparatus and a method of monitoring concentrations of selected species in solution during a semiconductor processing, wherein a spectrometer 22 is used for monitoring the concentration of water at 1380 nm;

Shen et al (US Patent No. 6,203,659 B1) teaches an apparatus and a method of monitoring concentrations of a photoresist material in solution during a semiconductor processing, wherein an IR light source 22 and a detector 24 are used for monitoring the concentration of ;

Snyder (US Patent No. 3,964,956), Snyder (US Patent No. 4,042,444), and Rangachar et al (US Patent No. 4,400,233) teaches apparatus and method of controlling and maintaining uniform concentration of etchant during an etching process.

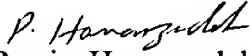
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Parviz Hassanzadeh whose telephone number is (703)308-2050. The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703)308-1633. The fax phone numbers for the

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organization where this application or proceeding is assigned are (703)872-9310 for regular communications and (703)872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.


Parviz Hassanzadeh
Primary Examiner
Art Unit 1763

September 2, 2003